

## **Urban Expansion Study**

A matter of concern all over the world is the degree to which urban expansion is encroaching into valuable farmland. It is of particular interest in Egypt's Nile River valley and delta, where agricultural expansion is limited by the surrounding desert. To study how urban growth is affecting the Nile area, the Egyptian Ministry of Development awarded a contract—financed by the U.S. Agency for International Development—to Planning and Development Collaborative International (PADC), Washington, D.C. NASA's Technology Application Center (TAC) at the University of New Mexico, Albuquerque, assisted PADC by providing survey maps and area measurements derived from computer processing of data from a Landsat Earth resources satellite.

The study group selected a six-year period from 1972 to 1978 as a basis for illustrating urban expansion in Egypt. Using the image processing system at TAC and a NASA-developed software package called ELAS, TAC classified raw Landsat data covering 21 Egyptian governorates within the Nile valley and delta. At upper right is a raw data image of the delta area around Alexandria. It shows a variety of color-coded features which were computer-processed and grouped into four basic categories: urban land, desert, agricultural land and water. A resulting classification image is shown at lower right; red is urban area, green is vegetated agricultural land, brown is desert and blue is water.

Similar classifications were made for all 21 of the governorates, using Landsat tapes from 1972 and 1978. For each governorate, classifications for the two dates were merged and computer-compared to form another image detailing urban expansion alone. The final products were maps and tables for the four classifications, by governorate or city in 1972 and 1978, and data showing the changes in urban, desert and agricultural acreages that had occurred between the two dates. The results were spot checked by PADC crews on the ground and reliable correlations were found. Due to an almost complete lack of aerial photos for the dates encompassed, the study could not have been accomplished without Landsat data and the NASA software.

